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Urbanization and Change in Cilacap Regency

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Abstract

Cilacap regency is one of many regencies in Central Java province, having anarea of 2,138.50 $Km^{2.}$. In 2011 the population was 1,755,268with 284 villages in 24 districts. Since the development over the region has been more concentrated in the industrial areas, the changing of agriculture area becoming urban area took place rapidly and significantly. Therefore knowledge of urban area determination to support development policy over region is needed.

The availability of abundant data of the region enable Multivariate data analysis be used to determination of urban area. The steps of determination are selection of available data, factor analysis, principal component analysis, and cluster analysis. This study aims to determine the urban area in Cilacap regency by multivariate analysis. The results is: there are 41 villages meet characteristic ofurban area. The villages that is considered urban areas are around the major road network indicated by having higher population and more facilities as compared to the surrounding area.

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Keywords: urban area; multivariate analysis; factor analysis; principal component analysis; cluster analysis.

1. Introduction

Cilacap regency is one of the regency in Central Java province, as an area of 2138.50 km^2, with 284 villages in

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24 districts. In 2011, the total population was 1,755,268 and the GRDP per capita was 14,124,430 rupiahs. As a regency with higher GRDP compared to other regencies in Central Java province, and has big regional potential, mainly due to the existence of vital facilities such as oil refinery, cement industry, agricultural, and in the future, an ocean port may be built with capability of receiving third generation vessels. The condition has brought rapid development of Cilacap regency from rural areas to urban areas. Since many villages in this regency potentially become urban areas, a policy is needed tosupport an even development over the region. This policy should be supported by the knowledgeof the urban area determination in Cilacap regency. The aim of the study is determination of urban areas in Cilacap regency by multivariate analysis.

Various studies have been conducted in identifying urban areas, but in line with more complex data, as **Joseph F. Hair Jr. et al** (2010) pointed out that "some of information can be analyzed and understood with simple statistics, but much of it requires more complex, multivariate statistical techniques to convert these data into knowledge". Urban and rural areas has been identified by **Kasikoen, Ken Martina** (2005), in West Java province by multivariate analysis, with district as the smallest area, and determination of urban area in Cilacap regency using villages as the smallest area. In implementing multivariate data analysis, program SPSS version 22 was used.

There are bundles of data by Village Potency Data (**PODES**) of Cilacap regency, and by multivariate data analysis, from 284 villages in Cilacap regency, has identified 41 villages as urban areas. The urban areas lies surrounding major road network with higher population and more facilities compare to the surrounding area.

2. Methodes

The important point of multivariate analysis is identification of variables which have simultaneous relationships among variables (**Dillon**, 1984). There are 571 variables from each of 284 villages in Cilacap regency from Villages Potential Data (PODES) 2011 produced by **Central Berau of Statistic** (2012). The major techniques determination of urban area in Cilacap regency, factor analysis and cluster analysis.

Factor analysis is an interdependence technique whose primary purpose is to define the underlying structure among the variables in the analysis (**Hair**, 2010). And principal component of analysis is factor analysis which is all data is analysis without assumption the unique variance in the data (**Dewi Savitri and Sri Maryati**, 2015).

Cluster analysis is a group of multivariate techniques whose primary purpose is to group objects based on the characteristics they posses, it classifies object on a set of user selected characteristics (**Hair**, 2010). It is a technique which purpose is dividing bundles of objects in sub clusters which are relatively homogeneous (**Dewi Savitri and Sri Maryati,** 2015**).**

In this study, the first step is identifying variables which can be used to determine urban areas. Since each object has a set of different data which have complex relation, factor analysis and principal component analysis are used to transforms variables to simple variable but still can explain the variation data of the object. Cluster analysis is used to determine the urban areas in Cilacap regency.

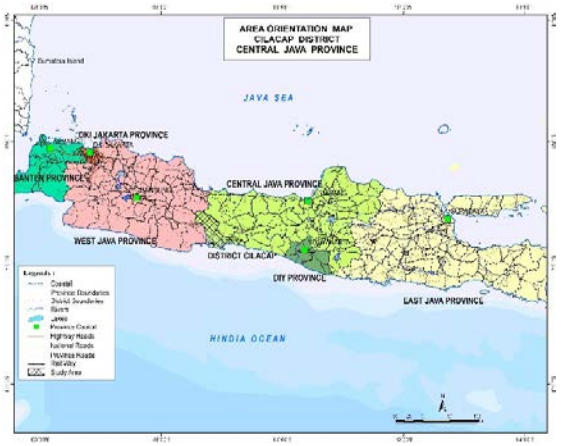
3. Result and Discussions

Cilacap regency, as data from Cilacap in Figures 2012 produce by Central Berau of Statistic - Cilacap Regency. (2012), is one of the regencies in Central Java province located in the southern part of the province as shown in **Fig. 1(a)**. The borders of Cilacap regency in the north is Banyumas and Brebes regencies, in the south Indonesian Ocean, in the west is West Java province and in the east is Kebumen regency. Cilacap regency comprises of 24 (twenty four) districts with 269 (two hundred sixty nine) villages and 15 (fifteen) *kelurahan*[i] spreading from north to south. Its area is 2,138.50 $Km^2$with administrative borders of each districtshown in **Fig. 1(b).**

Cilacap regency has total population of 1,755,268 with the density of 820.79 person/ Km^2 in 2011. The highest density is in the district which formed the city of Cilacap, and the density more than 1000 person/Km^2 are the districts which lies along the regional roadways from west to east, such as districts: Majenang, Kroya and Gandrungmangu. The lowest density is KampungLaut district, which lies in the seashore.

The data of characteristic of each villages are plentiful and variously available as produced by Potential Village/PODES of Cilacap regency. As the method of multivariate analysis, the data will be chosen by principal component analysis. The result, there are 18 (eighteen) variable chosen from the available data shown in **Table 1**.

a.



b.

Fig.1. (a) Cilacap Regency Orientation to Java Island; (b) Administrative Map of Cilacap Regency

Table 1. The Selected Relevant Variables out of Original Variable

Variable	Name	Code
X_1	Number of Population per Village/Kelurahan	PDDK
X_2	Number of Family units per Village/Kelurahan	KEL
X_3	Number of Agricultural Family units per Village/Kelurahan	KEL_TANI
X_4	Number of Family units with one or more family members(s) is/are Agricultural worker(s) per Village/Kelurahan	KEL_BRH_TANI
X_5	Number of Family units benefiting PLN electricity per Village/Kelurahan	KEL_PLN
X_6	Number of Kindergarten (or equivalent) per Village/Kelurahan	TK
X_7	Number of Elementary School (or equivalent) per Village/Kelurahan	SD
X_8	Number of Secondary Schools (or equivalent) per Village/Kelurahan	SLTP
X_9	Number of High Schools (or equivalent) per Village/Kelurahan	SLTA
X_{10}	Number of Universities (or equivalent) per Village/Kelurahan	PT
X_{11}	Number of Hospitals per Village/Kelurahan	RS
X_{12}	Number of Maternity Hospitals per Village/Kelurahan	RSB
X_{13}	Number of Clinics per Village/Kelurahan	POLI
X_{14}	Number of People Medical Centers per Village/Kelurahan	PUS
X_{15}	Number of Physical Doctors per Village/Kelurahan	DOKTER
X_{16}	Number of Nurses per Village/Kelurahan	BIDAN
X_{17}	Number of Puskedes per Village/Kelurahan	POSKEDES
X_{18}	Number of Posyandu per Village/Kelurahan	POSYANDU

Source : 2011 PODES and data Processing

The subsequent step is determining the villages which may be categorized as urban areas. By using the SPSS program version 22, and several times of iterations, it is identified that 41 out 284 villages/kelurahan in Cilacap Regency are urban area, whereas the remaining 243 villages are rural area. The 41 villages/kelurahan categorized as urban areas are listed as follows in **Table 2** below.

Table 2. Villages/Kelurahan Urban Category in Cilacap Regency

District	Villages/Kelurahan
Dayeuhluhur	Dayeuhluhur
Wanareja	Adimulya and Wanareja
Majenang	Pahonjean, Padangjaya, Sindangsari, Jenang, Salebu and Cibeunying
Karangpucung	Karangpucung and Ciporos
Cipari	Cipari
Sidareja	Sidareja
Gandrungmangu	Gandrungmangu
Bantarsari	Rawajaya, Bulaksari and Kamulyan
Kawunganten	Bojong and Kawunganten
Jeruklegi	JeruklegiWetan
Kesugihan	Menganti, Slarang, KesugihanKidul and Kalisabuk
Adipala	Adipala
Sampang	Sampang
Kroya	Kroya and Gentasar
Cilacap Selatan	Tambakreja, Tegalrejo, Sidakaya, Cilacap and Tegalkamulyan
Cilacap Tengah	Donan, Sidanegara and GunungSimping
Cilacap Utara	KebonManis, Gumilir, Mertasinga, TritihKulon and KarangTalung

Source : results of analysis

The geographical location each of the 41 Villages/Kelurahan above are shown in **Fig. 3.**

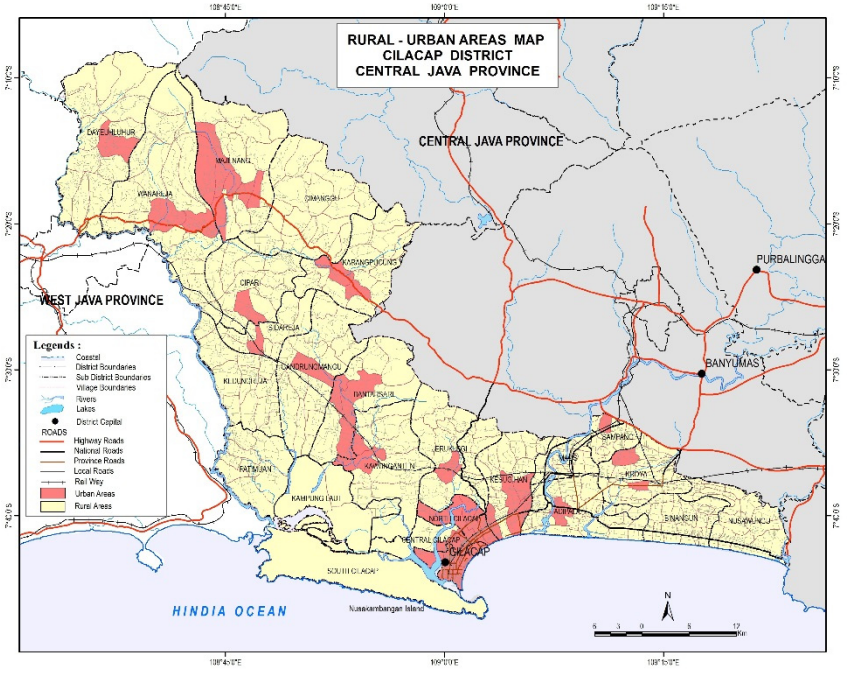


Fig. 2.The Geographical Location of Urban Area inCilacap Regency

Dayeuhluhur is an old village located in Dayeuhluhur district, in the north east of Cilacap regency. As an old villages and located on the regency's road, Dayeuhluhur has developed becoming a village with population density higher than other villages in the district. Adimulya and Wanareja in Wanareja district are villages located on the national road, therefore the development in this villages is high since many factors supporting this development. Pahonjean, Padangjaya, Sindangsari, Jenang, Salebu and Cibeunying are villages in Majenang district. They are located on the national road and so are Karangpucung and Ciporos villages in Karangpucung regency.

Cipari a village in Cipari district, Sidareja in Sidareja district, Gandrungmangu village in Gandrungmangu district, Rawajaya, Bulaksari and Kamulyan villages in Bantarsari district, Bojong and Kawunganten villages in Kawunganten district, JeruklegiWetan villages in Jeruklegi district, Menganti, Slarang, KesugihanKidul, Kalisabuk villages in Kesugihan district, Adipala villages in Adipala district, Sampang villages in Sampang district, Kroya and Gentasar villages in Kroya district, are villages located in provincial road, and most of them are municipal of the district.

Differing from villages mentioned above, are villages in Cilacap Selatan, Cilacap Tengah, Cilacap Utara districts, such as Tambakrejo, Tegalrejo, Sidakaya, Cilacap, TegalKamulyan, Donan, Sidanegara, GunungSimping, KebonManis, Gumilir, Mertasinga, TritihKulon, Karangtalun. They are all *kelurahan* which are political village administered by lurah and form as administrative city of Cilacap as municipal of Cilacap regency.

4. Conclusions

The determining variable for identifying urban area are various, therefore it is requiring comprehensive study to select the relevant variable for identification whether an area is urban area. Multivariate data analysis can be used for identifying urban area and as alternative to area typology analysis.Based on the identification of urban areas in the object of the study by multivariate data analysis, it is found that urban areas are sited sorrounding the available road network and have relatively high accessibility compared to other areas.

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